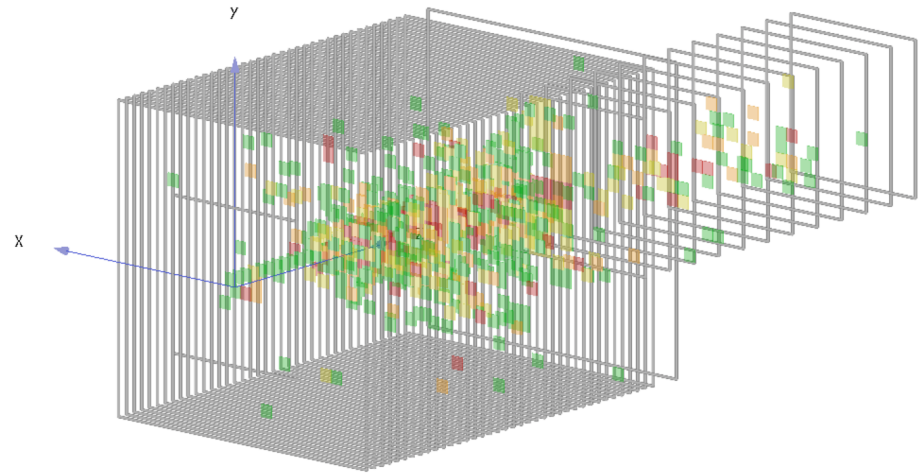


# Intermediate Wrap-Up and To-dos

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AHCAL analysis workshop  
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# Individual tasks/topics: Pedestal, Gain, MIP

- **Daniel:** AT pedestal and MIP, **Olin:** ET pedestal and gain
- pedestal stability: on individual memcell level, compare pedestals between two runs
  - with short time distance
  - with long time distance
  - one from May and one from June
  - with and without power pulsing
- quality check of pedestals: check for outliers (value and RMS), if OK, update AT pedestals in database, update dead channel map
- quality check of gain fits (MIP fits): check for outliers, fit quality, ...
- signal stability: on individual channel level, compare gain (MIP value) between two runs (as for pedestals)
- memcell stability: for a few channels, check that gain (MIP value) does not depend on memcell
- only for gain: implement **Anna's** procedure for averaging gains
- medium term: check gain (MIP) dependence on temperature, HV settings (maybe position, if trends in temperature visible)
- cross check PP stability for a few chips with ASIC testboard (**Amine**)



# Individual tasks/topics: high gain/low gain inter-calibration

- **Yuji, +?**
- for LED method: define clean range for determination of IC factor
- systematic cross checks (channel by channel):
  - between the different LED methods
  - between May and June
  - between power pulsing and no power pulsing (?)
  - is there a memory cell dependence (a few channels is enough)
- check for outliers, if OK update database
- for the MIP method: check HG distribution, maybe cut on HG values, plot LG vs. HG for each event
- (medium term?) use the method with shower data to cross check
- cross check PP stability for a few chips with ASIC testboard (**Amine**)

# Individual tasks/topics: temperature & temp. compensation

- **Yuji, +?**
- determine offsets from June switch-on data
- check that slopes are the same for HBUs that have been measure in climate chamber
- do 4D maps (temperature as a function of position and time) (**Anna?**)
- medium term: check stability of calibration vs. temperature or HV
  - are the T and HV values available in slcio file -> ask **Jiri**
  - make them available in analysis root tree
  - check gain (**Olin**) and MIP (**Daniel**) stability



# Individual tasks/topics: timing measurement

- **Christian, Lorenz**
- check (and maybe improve) consistency of calibrations
  - odd and even Bxids
  - with and without power pulsing
- check calibration for outliers/failed fits, if OK update database constants
- medium term: get rid of shoulders (consistency between time out and memory full)
- determine missing corrections (time walk, non-linearity), apply in reconstruction



# Individual tasks/topics: Tokyo layer/granularity

- **Naoki**
- clarify LY values: which are measured with which configuration (scintillator type, tile size, SiPM size), what are the expected scalings
- cross-check MIP with **Daniel**
- medium term: studies with ganging cells (combining four 3\*3cm<sup>2</sup> tiles into one 6\*6cm<sup>2</sup> tile):
  - in MC: compare directly
  - in data: get **Vladimir's** shower start variable, compare layers at a fixed distance from shower start
  - influence on dynamic range



# Individual tasks/topics: delay wire chambers (DWC)

- **Linghui**
- re-arrange plots (Felix???)
- test with run with lower trigger rate
- get information on what the DWCs do when rate is higher (**Katja, Thorben**)
- make wire chamber information accessible at the same place as AHCAL information (maybe help from **Christian?**)
- correlate spatial information between DWC and AHCAL
- medium term: apply calibration/alignment of wire chambers (help from **Thorben**)
- medium term: provide aligned wire chamber information in common analysis root tree



# Individual tasks/topics: Tailcatcher (TC)

- **Tatsuro**
- remove events where TC information is missing
  - proper treatment needs help from **Jiri**
  - as a first attempt: in pion and muon runs remove all events with no hits in TC
- compare with MC
- medium term: estimate expected leakage from MC
  - needs MC with TC with large layers (2\*2 HBUs) and more TC layers (e.g. 24) -> ask **Lan**





# Individual tasks/topics: Particle ID

- **Vladimir**
- graphical representation of cuts (such that changes are easy to follow)
- check if all generated events are found and identified
- show complete set of distributions (for all identified particle types)
- check MIPs in 40 or 120 GeV muon MC, compare with data (can be done with small statistics/few channels)
  - MPV at 1
  - energy sum
  - number of hits
  - output of particle ID
- (maybe) medium term: code cleanup
  - split code into processor and RootTreeWriter Engine
  - split into 2 processors (event variables, actual Particle ID), integrate other variables calculated at the moment in RootTreeWriter in the event variables processor (help from **Saiva**)



# Individual tasks/topics: electron cross checks

- **Anna, Amine**
- power pulsing / no power pulsing comparison (**Anna**)
  - ratio plots
  - longitudinal profiles
  - hit energy spectra per channel for most important channels
- data quality June (**Amine**)
  - hit energy spectra with high gain and low gain
  - define “standard” variables for data quality check, check them for electron runs, provide feedback for good run list
- compare with MC (careful, beam profiles not correct yet!)
- medium term: apply temperature corrections
- study dependence of response on shower positions (needs wire chamber data from **Linghui**)

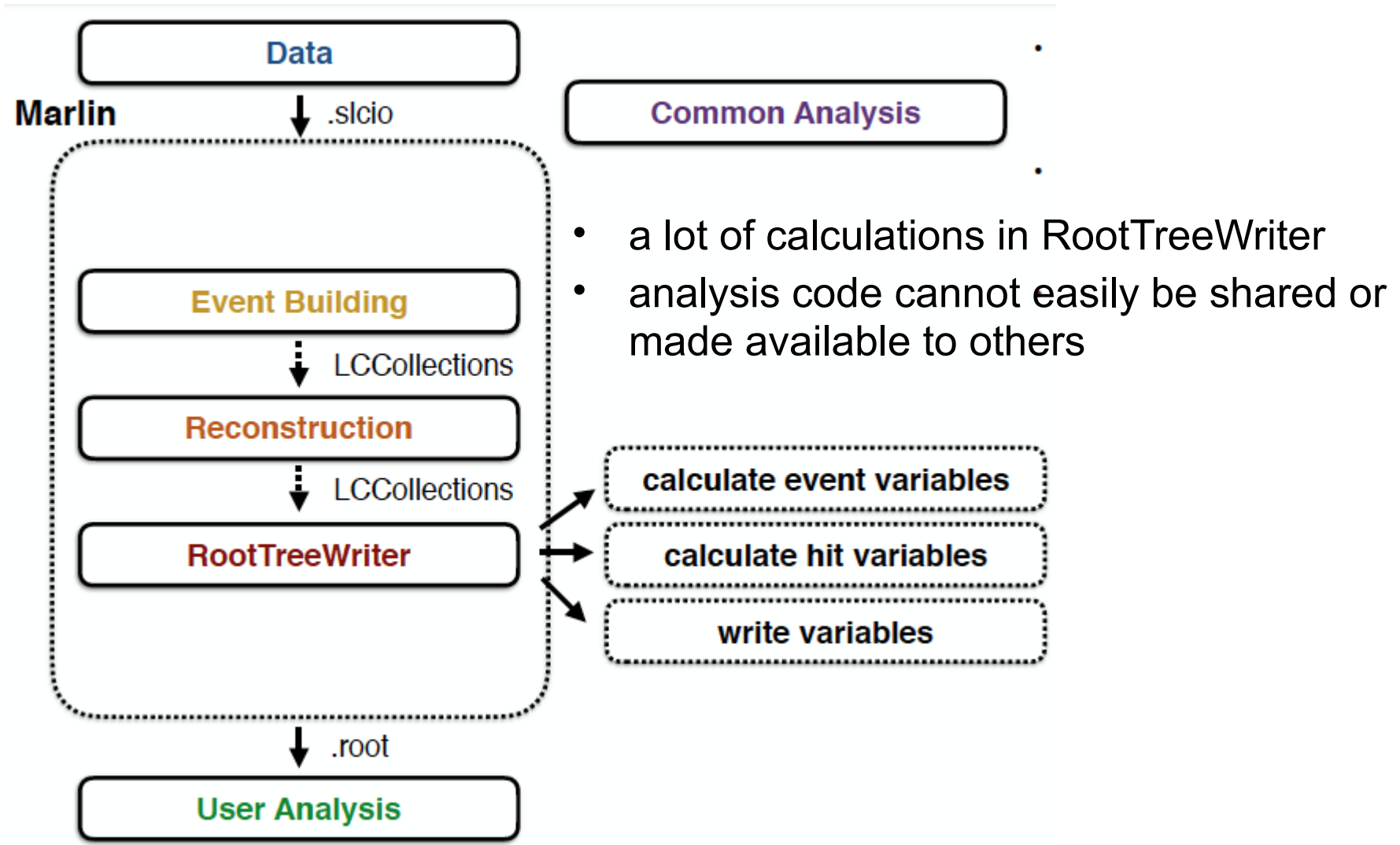


# Individual tasks/topics: pion cross checks

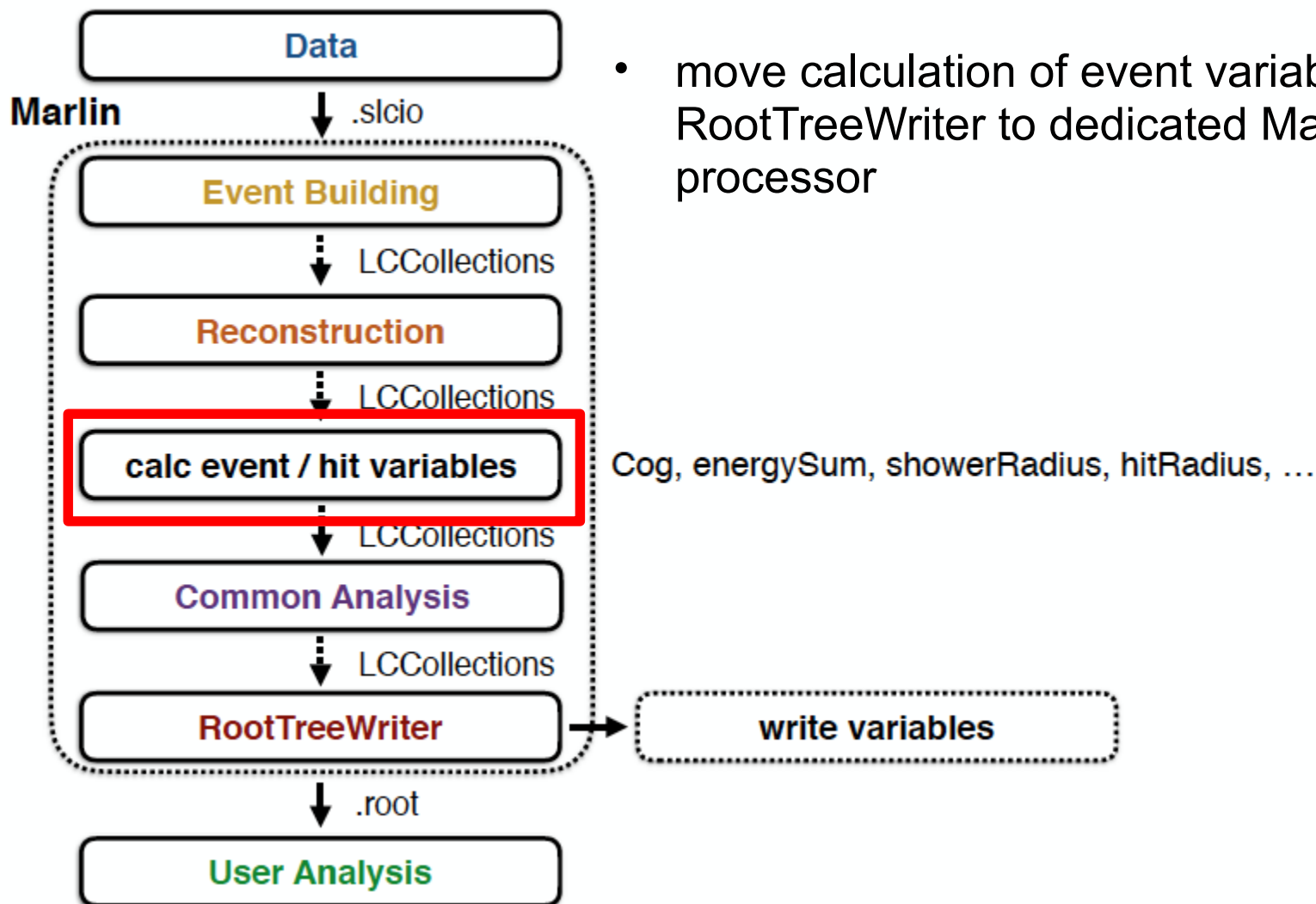
- **Erik, Saiva, Naoki**
- power pulsing / no power pulsing comparison: similar to electrons (**Naoki, Saiva?**)
  - ratio plots
  - longitudinal profiles
  - hit energy spectra per channel for most important channels
- data quality June (**Erik?, Saiva?**)
  - apply quality criteria derived from May data
- compare with MC (careful, beam profiles not correct yet!)



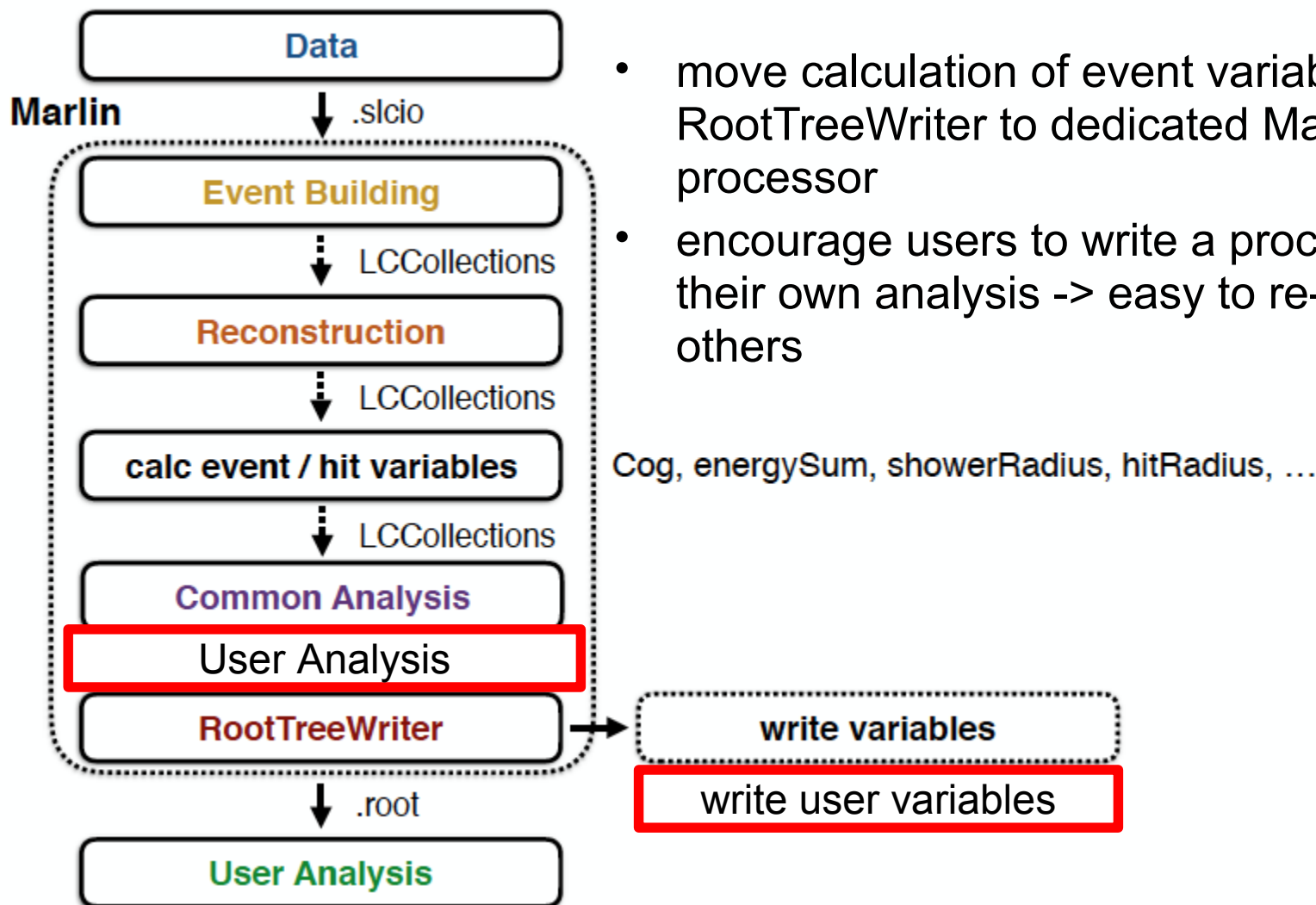
# Analysis workflow: present



# Analysis workflow: future

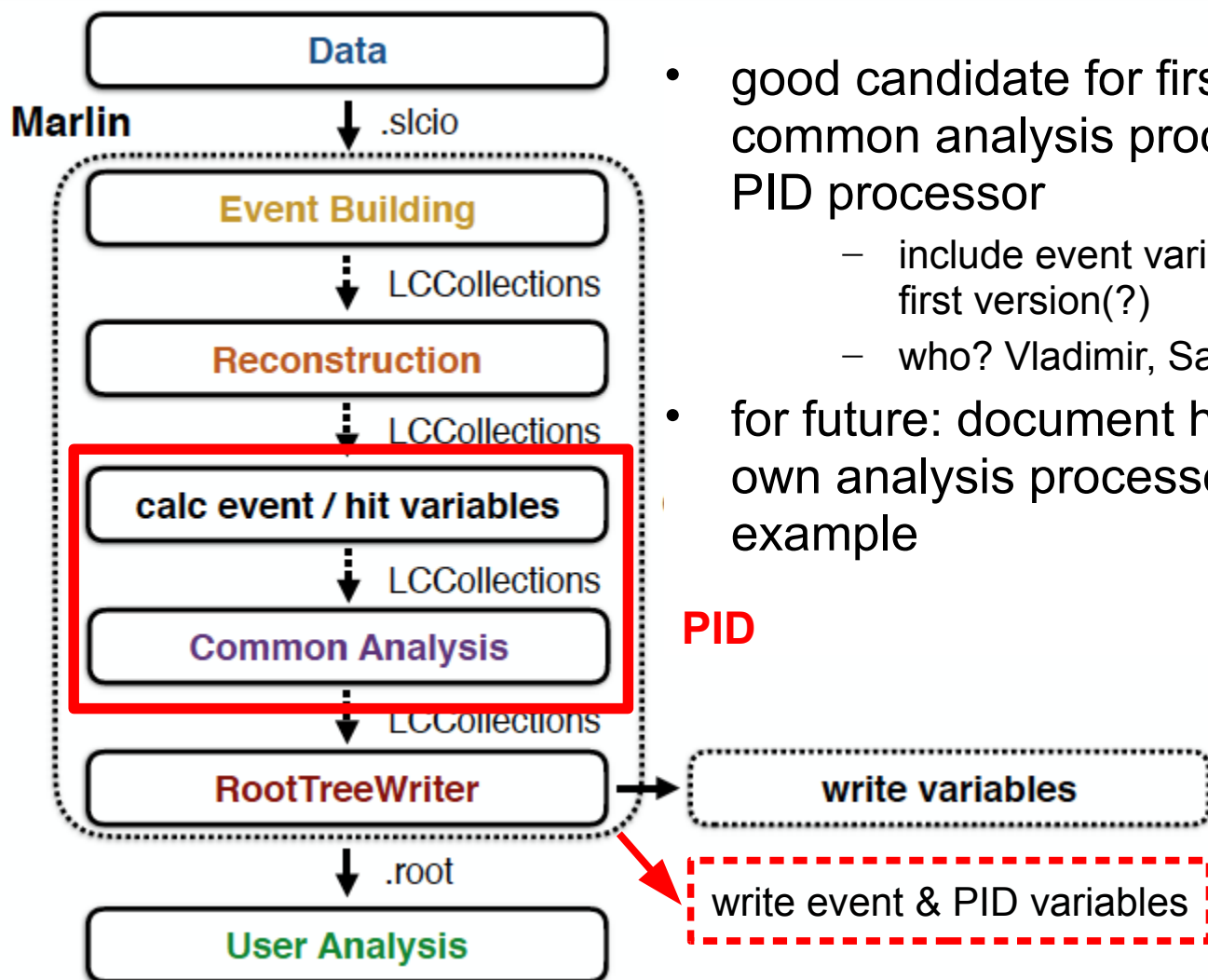


# Analysis workflow: future



- move calculation of event variables from RootTreeWriter to dedicated Marlin processor
- encourage users to write a processor for their own analysis -> easy to re-use for others

# Analysis workflow: future



- good candidate for first implementation of common analysis processor: Vladimir's PID processor
  - include event variables from root tree in first version(?)
  - who? Vladimir, Saiva with Christian?
- for future: document how to write your own analysis processor, provide an example

# Changes/Updates in Database

- fill all banks in June/July folder
- **properly tag and document new versions!**  
(find out what “HEAD” really does)
- update calibration constants
  - dead channel map (Olin, Daniel)
  - pedestal (Daniel)
  - gain (Olin)
  - MIP (Daniel)
  - HG/LG intercalibration (Yuji)
  - time constants (Christian, Lorenz)
  - temperature slopes?
- medium term: add new features/banks
  - time offsets for odd and even BXids
  - mem-cell dependent pedestals
  - BIF offset for PP/no PP





# Work for others

- Lan
  - simulation with larger tail catcher (twice the size in x, y, z dimensions)
  - can we get geometry/material information from simulation into data (how much X0 passed)?
- Jiri
  - what is stored for BIF?
  - how is the event building done in EUDAQ? what is used as reference time stamp?
  - is temperature and HV information stored in slcio file? if not, include it
  - clean up data at the end of ROC (prevent incomplete events)
  - selection to flag/remove events without tail catcher information



# Other tasks

- clean-up of code (no magic numbers in code, ...) -> coding conventions  
<https://confluence.desy.de/display/Calice/Coding+conventions>
- beam profile for MC
  - muons: not so important
  - pions
  - electrons

